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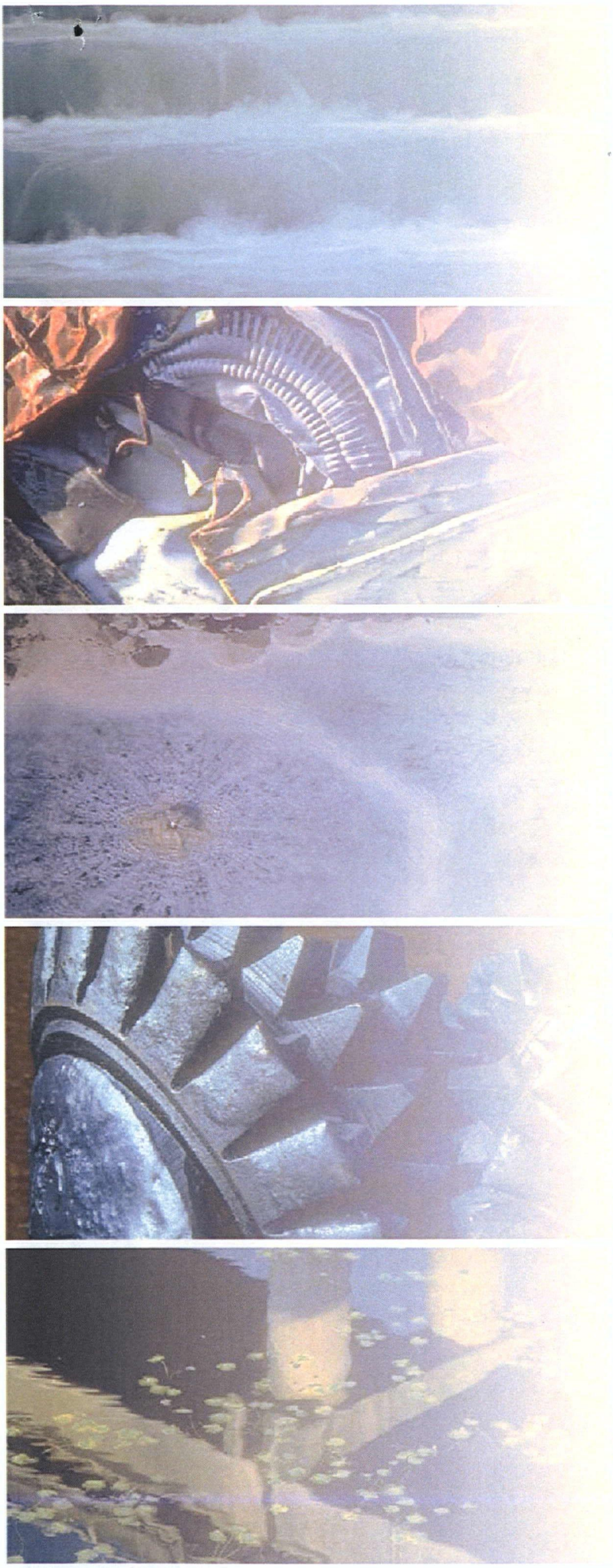

Work Plan for Emergency Remedial Action Upper Tailings Pile Van Stone Mine

Prepared for
Washington State
Department of Ecology

October 15, 2012
17800-34

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Upper Tailings Pile
Van Stone Mine

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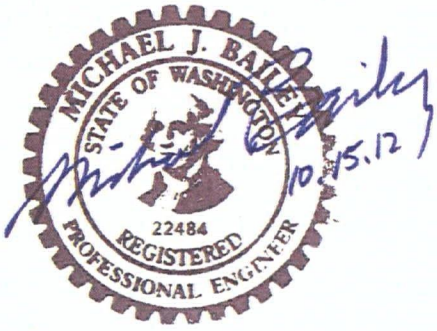
Prepared by
Hart Crowser, Inc.



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CONTENTS

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WORK PLAN FOR EMERGENCY REMEDIAL ACTION
UPPER TAILINGS PILES
VAN STONE MINE

1.0 INTRODUCTION

This work plan outlines the proposed tasks for an Emergency Remedial Action at the Van Stone Mine (the Site) that will be completed during fall 2012. This work is being fast tracked by Ecology to address a serious breach in the Upper Tailings Pile where the failure resulted in tailings being transported by surface water down slope and into the southeast tributary of Onion Creek. The area of the breach is unstable and continuing erosion and transport of tailing toward and into the tributary likely to occur during future precipitation events. Ecology is undertaking this Emergency Action to stabilize the breach and reduce surface water retention on the southern portion of the tailing pile prior to the onset of winter conditions at the mine site.

Following this introduction, the work plan briefly discusses the mine location and former operations, and provides a brief history of tailings pile failures at the Site. The plan also describes:

The purpose and objectives of this remedial action;

- The description and basis of design for the remedial action; and
- The materials and execution of the remedial action.

2.0 BACKGROUND

The Van Stone Mine Site is located in the upper portion of Onion Creek watershed, 23 miles northeast of Colville, Washington in the Northport (Aladdin) mining district. The lead-zinc deposit covers about 1,400 acres in Sections 29, 30, and 33 of Township 38N, Range 40E. When mining at the Site stopped in 1993, the Department of Natural Resources (DNR) reported that approximately 328 acres of the area was "disturbed."[1] The Site currently contains two open pit

[1] Letter from Washington State Department of Natural Resources Division of Geology and Earth Resources, "Report on Certain Aspects of the Van Stone Mine, Stevens Co., WA."

mines, overburden stockpiles, waste rock dumps, access and haul roads, and two tailings piles.

During mine operation, blasted rock was hauled by truck from the open pits to the rock house crusher plant, which then fed crushed rock on a conveyor to the mill. Waste rock was hauled by truck to waste rock dump areas near the open pits. The mill was a dual-circuit flotation system that produced 55 percent zinc concentrate and 70 percent lead concentrate. The final ore concentrates were trucked off site for further processing.

Fine-grained tailings were initially conveyed to the Upper Tailings Pile and later to the Lower Tailings Pile through an 8-inch wood stave pipe. The wood stave pipe was replaced with a cement-asbestos pipe by Asarco. When mine operations restarted in the early 1990s, Equinox replaced the cement-asbestos pipe with a black ABS continuous-weld pipe to convey tailings from the thickener to the Lower Tailings Pile.

The Upper Tailings Pile was used until a major berm failure in 1961. The Upper Tailings Pile currently covers about 9.5 acres and contains approximately 780,000 tons of tailings. After 1961, the Lower Tailings pile was constructed. It currently covers about 40 acres and contains approximately 1,820,000 tons of tailings.

During rain events over the past two years, a portion of the Upper Tailings Pile again failed, releasing a mixture of pond water and tailings. This breach appears to have occurred in the general area of previous breaches. During a site visit in June 2012, Brendan Dowling, the Ecology Project Manager, observed that a substantial release of water ponded on the tailing had eroded and transported tailings downgradient and into the southeast tributary of Onion Creek.

2.1 Purpose and Objectives of Emergency Remedial Action

The purpose of this action is to minimize or eliminate releases of tailings from the Upper Tailings Pile because of erosion. As discussed above, the berm on the downstream edge of the western part of the Upper Tailings Pile (lower in elevation) failed. Based on field observations, it appears that a new berm was created at the crest of the failure in an attempt to retain precipitation on the tailings pile. The most recent failure, starting sometime during the 2011 rainy season, breached the repaired berm, further expanding the footprint of the previous failure. Drawing C-2.0 presents the current site conditions as well as the approximate berm location(s) based on field observations.

Rather than reconstructing the berm to retain rain and snowmelt on the top of the pile, the objective of the action described herein is to provide a designed drainage through the failed section. Side slopes of the existing breach will be regraded and revegetated and the channel will be armored with stone to retard the runoff velocity and reduce/eliminate the transport of tailings from the pile. For the purposes of this Work Plan, the existing tailings pile breach and areas downslope of the toe of the tailings pile will be designated as Area 1.

The Upper Tailings Pile appears to have been constructed in a series of lifts. This resulted in the two distinct tailings disposal areas and tailings ponds separated by a drainage ditch (see Drawing C1). Recent observations made during an August 10, 2012, site visit indicate that previous work may have been done to line the ditch. For this Work Plan, the ditch and areas of upstream and downstream of the ditch are designated as Area 2. Erosion upstream of the ditch may be preventing runoff from entering the ditch as intended. Regrading the ditch and immediate upstream areas, as well as armoring the ditch channel, will reestablish the intended drainage pattern and reduce the volume of water currently flowing through Area 1.

3.0 DESCRIPTION AND BASIS OF DESIGN

This section, Drawings C-1.0 through C-6.0 (Appendix A) and the hydrologic/ hydraulic analysis present the observations, assumptions and calculations used to design the actions at Areas 1 and 2.

3.1 Area 1 –Tailings Pile Breach Repair

The general scope of work for Area 1 includes the following work elements:

- The dimensions of the existing channel bottom created by the breach shall remain approximately the same.

- Beginning at the mouth of the breach and working upstream, the side slopes of the breach shall be cut back to a 2H:1V (horizontal to vertical) slope. Cut material (spoils), which consists of mine tailings, shall be used to: 1) create a new berm, generally matching the existing berm at the top of the slope, and; 2) provide positive drainage to the newly constructed channel and eliminate localized ponding by placing the remaining spoils on top of the pile and regrading.

- Geotextile shall be placed in the channel, anchored into side slopes, and covered with spalls. The bottom of the channel and lower 4 feet of the newly graded side slopes will be lined with 12 inches of quarry spalls.

- The side slopes of the channel, above the spalls, shall be hydroseeded to provide erosion control. Measures will be taken, including the use of tackifier and erosion control blankets to prevent the hydroseed from being washed down the channel before the grass is established.

- Downstream of the breach, quarry spalls shall be placed on the existing dirt access road and continue approximately 100 feet downstream, which is the visual extent of the released tailings transport. Again, geotextile will be placed and covered with quarry spalls.

To design the aforementioned features, the following calculations and/or assumptions were made:

- Using topographical maps and field notes obtained during various site visits, a drainage area (DA) of approximately 11 acres was used to calculate runoff volumes and flow rates for the channel design. The 11 acres (0.017 square miles) is a conservative estimate of the area that drains to the southern portion of the Upper Tailings Pile, which is the area where major erosion has occurred).

- Since the DA is much less than 200 acres, the Rational Method will give a good estimate for peak discharge. Based on the 11 acre DA, the Rational Method Peak Discharge, Q, equals 6.6 cubic feet per second (cfs) for a 100-year event. Again, the 11 acres is fairly conservative, so 6.6 cfs should be sufficient for design.

- Using survey data collected on August 22, 2012, the existing channel bottom width varies from 10 to 30 feet wide and the slope of the channel is approximately 0.06 ft/ft. Using these values, the normal and critical flow conditions are summarized as follows:

Bottom Width, b (ft)	Side slope, z	Bottom slope, S	Manning's Coefficient, n	Flow, Q (cfs)	Normal depth, Y_n (ft)	Critical depth, Y_c (ft)	Normal velocity, V_n (cfs)	Critical velocity, V_n (cfs)
10	2:1	0.06	0.035	6.6	0.19	0.24	3.29	2.69
25	2:1	0.06	0.035	6.6	0.11	0.13	2.34	2.03

- Based on the calculated flow depth and channel dimensions, the particle size needed for riprap (D50) is approximately 0.2 feet (2.4 inches), according to

the WSDOT Hydraulics Manual (Chapter 4). This translates to the use of quarry spalls as described above.

3.2 Area 2 – Intermediate Drainage Improvements

Field observations indicate that runoff from the northern pile, which is intended to be conveyed via a ditch between the two piles of tailing, contributes to the runoff volume flowing through Area 1. To minimize the volume of water flowing through Area 1 and to generally reduce future erosion potential, the following general scope of work shall be completed at Area 2:

- The profile of the ditch shall be regraded/reestablished by removing existing piles of crushed rock and regrading to provide positive drainage.
- The channel shall be lined with geotextile and then a 12-inch-thick layer of quarry spalls, a minimum of 2 feet up the channel sides.
- Downstream of the channel, geotextile and quarry spalls shall be placed across the access road to further protect the road from potential erosion.
- Upstream of the ditch and adjacent to the access road, the drainage along the southern side of the road shall be regraded and lined with spalls to reduce/eliminate erosion. At the base of the ditch, runoff will be directed to an existing culvert that directs water under the road and to the head of the intermediate ditch. Both the culvert entrance and exit will be improved by regrading and lining with geotextile and spalls.

To design these features, the following calculations and/or assumptions were made:

- Based on topography and field observations, the DA for the ditch that splits the two portions of the Upper Tailings Pile is approximately 3.2 acres. The 3.2 acres (0.005 square miles) is a conservative estimate.
- Again, the Rational Method will give a good estimate for peak discharge due to the small DA. Based on the 3.2-acre DA, the Rational Method Peak Discharge, Q, equals 1.9 cfs for a 100-year event, rounded up to 2.0 cfs for calculations.
- The ditch has two segments: an upper and lower segment with different slopes. The upper segment has an average slope of 0.02 ft/ft and the lower segment has a slope of 0.08 ft/ft.

- The channel width also varies between the upper and lower segments. The channel is approximately 4 to 5 feet wide in the upper segment and 1 to 2 feet wide at the lower.

- The side slopes were estimated based on the northeast side of the ditch (steeper than the southwest side). The upper segment side slope (z) equals 0.32 ft/ft (6.25:1). The lower segment side slope (z) equals 0.16 ft/ft (3.125:1).

- Using the aforementioned values, the calculated normal and critical flow conditions are as follows:

Ditch Segment	Bottom Width, b (ft)	Side slope, z	Bottom slope, S	Manning's Coefficient, N	Flow, Q (cfs)	Normal depth, Y_n (ft)	Critical depth, Y_c (ft)	Normal velocity, V_n (cfs)	Critical velocity, V_n (cfs)
Upper	4	6.25:1	0.02	0.027	2.0	0.18	0.18	2.17	2.18
Lower	1	3.13:1	0.08	0.027	2.0	0.24	0.35	4.68	2.72

- Riprap size is based on Chapter 4 of the WSDOT Hydraulics Manual using calculated depth of flow and channel dimensions. The particle size needed for riprap (D50) is approximately 0.25 feet. The equivalent type of rock lining for this size is quarry spalls.

4.0 MATERIALS AND EXECUTION

This section lists material specifications and site-specific information applicable to the execution of this interim/emergency remedial action.

4.1 Geotextile

Geotextile shall consist of 10- to 12-ounce non-woven geotextile, such as US Fabrics US 250NW, or approved equal. The fabric will be installed according to manufacturer's guidelines for use under riprap.

4.2 Quarry Spalls

Channel lining shall consist of quarry spalls as specified in the WSDOT Geotechnical Design Manual, Chapter 5.

There is a large amount of waste rock present at the site. This rock may be available for use as channel lining. If this rock is used, a detailed accounting of the quantity of rock used will be kept for Ecology's records.

Alternatively, channel lining rock shall be imported from local quarry source(s).

4.3 Subgrade Preparation

In general, all subgrades shall be prepared to provide positive drainage in accordance with the design drawings and shall be compacted to support the intended use, either as a lined drainage channel or revegetated side slope. In areas where geotextile shall be placed, protruding rocks or other debris that would affect geotextile fabric placement shall be removed and stockpiled on the upstream edge of the tailings pile.

4.4 Hydroseed

All tailings areas disturbed by construction that are not protected by geotextile and quarry spalls, and/or a slope greater than 20H:1V shall be protected at the end of construction by hydroseeding with a Bonded Fibre Matrix (moderate term mulch) acceptable to Ecology. Prior to application submit for approval a mix design that includes seed mixture, mulch, tackifier, and proposed rate of application.

4.5 Access and Clearing

The work area will be accessed using the access road downgradient toe of the tailings pile. Extensive clearing is not anticipated. However, if trees or other obstructions must be removed to allow access, Ecology approval shall be required in advance. All efforts to minimize clearing shall be made.

4.6 Stormwater Management

Best Management Practices (BMPs) referred to below are described in Ecology's Stormwater Management Manual for Eastern Washington.

It is anticipated that this work will take place during dry weather. However, materials (rocks for check dams, straw waddles, etc.) should be on hand and available for use if needed. Silt fence is not greatly effective for flows larger than 0.5 cfs; therefore, if precipitation events larger than one inch of rain in four hours are expected, the contractor shall utilize rock check dams (BMP C207) in addition to silt fence. These check dams shall be installed along the erosional paths that currently flow from the tailings piles, through the trees, to the Southeast tributary of Onion Creek. The construction of small dams across the existing pathway/swale will reduce the velocity of concentrated flow and dissipate energy at the check dam.

Prior to beginning any land disturbing activities, the Contractor shall preserve existing natural vegetation (BMP C101), when possible, and also utilize buffer zones (BMP C102) in between the tailings piles and the Southeast tributary of Onion Creek.

The Stormwater Management Manual also provides requirements for exposed soils. For this project, soil BMPs shall apply to tailings. Exposed and unworked tailings shall be temporarily or permanently stabilized as soon as practicable by application of effective BMPs that protect the tailings from the erosive forces of raindrops, flowing water, and wind.

No tailings or construction disturbed soils shall remain exposed and unworked for more than the time periods set forth below to prevent wind and water erosion. This stabilization requirement applies to all tailings disturbed by construction, whether at final grade or not.

- During the regional dry season (July 1 through September 30): 10 days
- During the regional wet season (October 1 through June 30): 5 days

All tailings stockpiles shall be stabilized and protected with erosion and sediment control BMPs (including, but not limited to, BMPs C120-126).

Maintain TESC for duration of construction. Remove TESC only when directed by Ecology

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APPENDIX A
DESIGN DRAWINGS

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Emergency Remedial Action Upper Tailings Pile
Van Stone Mine
Stevens County, Washington

DEPARTMENT OF ECOLOGY
State of Washington

Prepared for

Toxics Cleanup Program
Department of Ecology
State of Washington

HARTCROWSER

by

Hart Crowser, Inc.

Date: October 12, 2012

MICHAEL J. BAILEY
STATE OF WASHINGTON
22484
REGISTERED
PROFESSIONAL ENGINEER
10.15.12

VAN STONE MINE
COVER SHEET

Drawing Reference Number:
G-1
Sheet 1 of 6

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GENERAL CONSTRUCTION NOTES

1) PLANS, SECTIONS, AND DETAILS ARE DIAGRAMMATIC AND FOR INFORMATION PURPOSES ONLY. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS WHERE NEEDED TO ACCOMPLISH THE WORK AND CONTACT ECOLOGY IF DISCREPANCIES ARE DISCOVERED.

2) CONTRACTOR SHALL LOCATE ALL UNDERGROUND UTILITIES USING PUBLIC (1-800-424-5555/WWW.CALLBEFOREYOUDIG.ORG) AND PRIVATE UTILITY LOCATION SERVICES PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL MAINTAIN SUCH UTILITY LOCATIONS THROUGHOUT PROJECT WORK, AS NEEDED, TO COMPLETE WORK.

3) ALL WORK SHALL BE IN ACCORDANCE WITH THE WASHINGTON STATE LABOR AND INDUSTRIES STANDARDS, FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION, AND OTHER APPLICABLE COUNTY, STATE, AND FEDERAL REGULATIONS.

AREA 1 –TAILINGS PILE BREACH REPAIR

1) THE DIMENSIONS OF THE EXISTING CHANNEL BOTTOM CREATED BY THE BREACH SHALL REMAIN APPROXIMATELY THE SAME.

2) BEGINNING AT THE MOUTH OF THE BREACH AND WORKING UPSTREAM, THE SIDE SLOPES OF THE BREACH SHALL BE CUT BACK TO A 2H:1V (HORIZONTAL TO VERTICAL) SLOPE.

3) CUT MATERIAL (SPOILS), WHICH CONSISTS OF MINE TAILINGS, SHALL BE USED TO: 1) CREATE A NEW BERM, GENERALLY MATCHING THE EXISTING BERM AT THE TOP OF THE SLOPE, AND; 2) PROVIDE POSITIVE DRAINAGE TO THE NEWLY CONSTRUCTED CHANNEL AND ELIMINATE LOCALIZED PONDING BY PLACING THE REMAINING SPOILS ON TOP OF THE PILE AND REGRADING.

4) GEOTEXTILE SHALL BE PLACED IN THE CHANNEL, ANCHORED INTO SIDE SLOPES, AND COVERED WITH SPALLS. THE BOTTOM OF THE CHANNEL AND LOWER 4 FEET OF THE NEWLY GRADED SIDE SLOPES WILL BE LINED WITH 12 INCHES OF QUARRY SPALLS.

5) THE SIDE SLOPES OF THE CHANNEL, ABOVE THE SPALLS, SHALL BE HYDROSEEDED TO PROVIDE EROSION CONTROL. MEASURES WILL BE TAKEN, INCLUDING THE USE OF TACKIFIER AND EROSION CONTROL BLANKETS TO PREVENT THE HYDROSEED FROM BEING WASHED DOWN THE CHANNEL BEFORE THE GRASS IS ESTABLISHED.

6) DOWNSTREAM OF THE BREACH, QUARRY SPALLS SHALL BE PLACED ON THE EXISTING DIRT ACCESS ROAD AND CONTINUE APPROXIMATELY 100 FEET DOWNSTREAM, WHICH IS THE VISUAL EXTENT OF THE RELEASED TAILINGS TRANSPORT. AGAIN, GEOTEXTILE WILL BE PLACED AND COVERED WITH QUARRY SPALLS.

AREA 2 – INTERMEDIATE DRAINAGE IMPROVEMENTS

1) THE PROFILE OF THE DITCH SHALL BE REGRADED/REESTABLISHED BY REMOVING EXISTING PILES OF CRUSHED ROCK AND REGRADING TO PROVIDE POSITIVE DRAINAGE.

2) THE CHANNEL SHALL BE LINED WITH GEOTEXTILE AND THEN A 12-INCH-THICK LAYER OF QUARRY SPALLS, A MINIMUM OF 2 FEET UP THE CHANNEL SIDES.

3) DOWNSTREAM OF THE CHANNEL, GEOTEXTILE AND QUARRY SPALLS SHALL BE PLACED ACROSS THE ACCESS ROAD TO FURTHER PROTECT THE ROAD FROM POTENTIAL EROSION.

4) UPSTREAM OF THE DITCH AND ADJACENT TO THE ACCESS ROAD, THE DRAINAGE ALONG THE SOUTHERN SIDE OF THE ROAD SHALL BE REGRADED AND LINED WITH SPALLS TO REDUCE/ELIMINATE EROSION. AT THE BASE OF THE DITCH, RUNOFF WILL BE DIRECTED TO AN EXISTING CULVERT THAT DIRECTS WATER UNDER THE ROAD AND TO THE HEAD OF THE INTERMEDIATE DITCH. BOTH THE CULVERT ENTRANCE AND EXIT WILL BE IMPROVED BY REGRADING AND LINING WITH GEOTEXTILE AND SPALLS.

MATERIALS AND EXECUTION:

GEOTEXTILE

1) GEOTEXTILE SHALL CONSIST OF 10- TO 12-OUNCE NON-WOVEN GEOTEXTILE, SUCH AS US FABRICS US 250NW, OR APPROVED EQUAL. THE FABRIC WILL BE INSTALLED ACCORDING TO MANUFACTURER'S GUIDELINES FOR USE UNDER RIPRAP.

QUARRY SPALLS

1) CHANNEL LINING SHALL CONSIST OF QUARRY SPALLS AS SPECIFIED IN THE WSDOT GEOTECHNICAL DESIGN MANUAL, CHAPTER 5.

2) SPALLS SHALL BE IMPORTED FROM LOCALLY AVAILABLE QUARRY SOURCE(S). CONTRACTOR SHALL PROVIDE CERTIFICATE OF ORIGIN FOR ECOLOGY APPROVAL PRIOR TO IMPORTING ANY MATERIAL.

SUBGRADE PREPARATION

1) IN GENERAL, ALL SUBGRADES SHALL BE PREPARED TO PROVIDE POSITIVE DRAINAGE IN ACCORDANCE WITH THE DESIGN DRAWINGS AND SHALL BE COMPACTED TO SUPPORT THE INTENDED USE, EITHER AS A LINED DRAINAGE CHANNEL OR REVEGETATED SIDE SLOPE. IN AREAS WHERE GEOTEXTILE SHALL BE PLACED, PROTRUDING ROCKS OR OTHER DEBRIS THAT WOULD AFFECT GEOTEXTILE FABRIC PLACEMENT SHALL BE REMOVED AND STOCKPILED ON THE UPSTREAM EDGE OF THE TAILINGS PILE.

HYDROSEED

1) ALL TAILINGS AREAS DISTURBED BY CONSTRUCTION THAT ARE NOT PROTECTED BY GEOTEXTILE AND QUARRY SPALLS, AND SLOPE GREATER THAN 20H:1V SHALL BE PROTECTED AT THE END OF CONSTRUCTION BY HYDROSEEDING WITH A BONDED FIBRE MATRIX (MODERATE TERM MULCH) ACCEPTABLE TO ECOLOGY.

2) THE CONTRACTOR SHALL PROVIDE THE FOLLOWING SEED MIX, CERTIFIED FREE OF NOXIOUS WEEDS:

% BY WEIGHT	KIND AND VARIETY	MIN % PURE	MIN % GERM
10	INDIAN RICEGRASS	95	85
20	SHEEP FESCUE	95	85
10	SILKY LUPINE	95	85
20	SHERMAN BIG BLUEGRASS	95	80
30	BLUEBUNCH WHEATGRASS	95	85
10	SAND DROPSEED	95	85
WEED SEED	0.25% MAX		
INERT AND OTHER CROP	3.50% MAX		

CLEARING

1) EXTENSIVE CLEARING IS NOT ANTICIPATED. HOWEVER, IF TREES OR OTHER OBSTRUCTIONS MUST BE REMOVED TO ALLOW ACCESS, ECOLOGY APPROVAL SHALL BE REQUIRED IN ADVANCE. ALL EFFORTS TO MINIMIZE CLEARING SHALL BE MADE.

STORMWATER MANAGEMENT

1) BEST MANAGEMENT PRACTICES (BMPs) CITED BELOW ARE FROM ECOLOGY'S STORMWATER MANAGEMENT MANUAL FOR EASTERN WASHINGTON, WHICH IS INCORPORATED HEREIN FOR REFERENCE.

2) IT IS ANTICIPATED THAT THIS WORK WILL TAKE PLACE DURING DRY WEATHER. HOWEVER, MATERIALS (ROCKS FOR CHECK DAMS, STRAW WADDLES, ETC.) SHOULD BE ON HAND AND AVAILABLE FOR USE IF NEEDED. SILT FENCE IS NOT GREATLY EFFECTIVE FOR FLOWS LARGER THAN 0.5 CFS; THEREFORE, IF PRECIPITATION EVENTS LARGER THAN ONE INCH OF RAIN IN FOUR HOURS ARE EXPECTED, THE CONTRACTOR SHALL UTILIZE ROCK CHECK DAMS (BMP C207) IN ADDITION TO SILT FENCE. THESE CHECK DAMS SHALL BE INSTALLED ALONG THE EROSIONAL PATHS THAT CURRENTLY FLOW FROM THE TAILINGS PILES, THROUGH THE TREES, TO THE SOUTHEAST TRIBUTARY OF ONION CREEK. THE CONSTRUCTION OF SMALL DAMS ACROSS THE EXISTING PATHWAY/SWALE WILL REDUCE THE VELOCITY OF CONCENTRATED FLOW AND DISSIPATE ENERGY AT THE CHECK DAM.

3) PRIOR TO BEGINNING ANY LAND DISTURBING ACTIVITIES, THE CONTRACTOR SHALL PRESERVE EXISTING NATURAL VEGETATION (BMP C101), WHEN POSSIBLE, AND ALSO UTILIZE BUFFER ZONES (BMP C102) IN BETWEEN THE TAILINGS PILES AND THE SOUTHEAST TRIBUTARY OF ONION CREEK.

4) THE STORMWATER MANAGEMENT MANUAL ALSO PROVIDES REQUIREMENTS FOR EXPOSED SOILS. FOR THIS PROJECT, SOIL BMPS SHALL APPLY TO TAILINGS. EXPOSED AND UNWORKED TAILINGS SHALL BE TEMPORARILY OR PERMANENTLY STABILIZED AS SOON AS PRACTICABLE BY APPLICATION OF EFFECTIVE BMPS THAT PROTECT THE TAILINGS FROM THE EROSIVE FORCES OF RAINDROPS, FLOWING WATER, AND WIND.

5) NO TAILINGS SHALL REMAIN EXPOSED AND UNWORKED FOR MORE THAN THE TIME PERIODS SET FORTH BELOW TO PREVENT WIND AND WATER EROSION. THIS STABILIZATION REQUIREMENT APPLIES TO ALL TAILINGS DISTURBED BY CONSTRUCTION, WHETHER AT FINAL GRADE OR NOT.

DURING THE REGIONAL DRY SEASON (JULY 1 THROUGH SEPTEMBER 30): 10 DAYS

DURING THE REGIONAL WET SEASON (OCTOBER 1 THROUGH JUNE 30): 5 DAYS

6) ALL TAILINGS STOCKPILES SHALL BE STABILIZED AND PROTECTED WITH EROSION AND SEDIMENT CONTROL BMPS (INCLUDING, BUT NOT LIMITED TO, BMPS C120-126).

7) MAINTAIN TESC FOR DURATION OF CONSTRUCTION. REMOVE TESC ONLY WHEN DIRECTED BY ECOLOGY.

MICHAEL J. BAILEY
STATE OF WASHINGTON
22484
REGISTERED PROFESSIONAL ENGINEER

HART CROWSER

REV. 1 | ISSUED FOR CONSTRUCTION
DRAFT FOR REVISION

Designed by: CP | Date: 10/12/12 | Rev. 1
Dwn by: EL | Ckd by: MJB | Job Number: 17800-34
Reviewed by: MJB
Submitted by: HART CROWSER, INC.

VAN STONE MINE

NOTES/SPECIFICATIONS

Drawing Reference Number: G-2

Sheet 2 of 8

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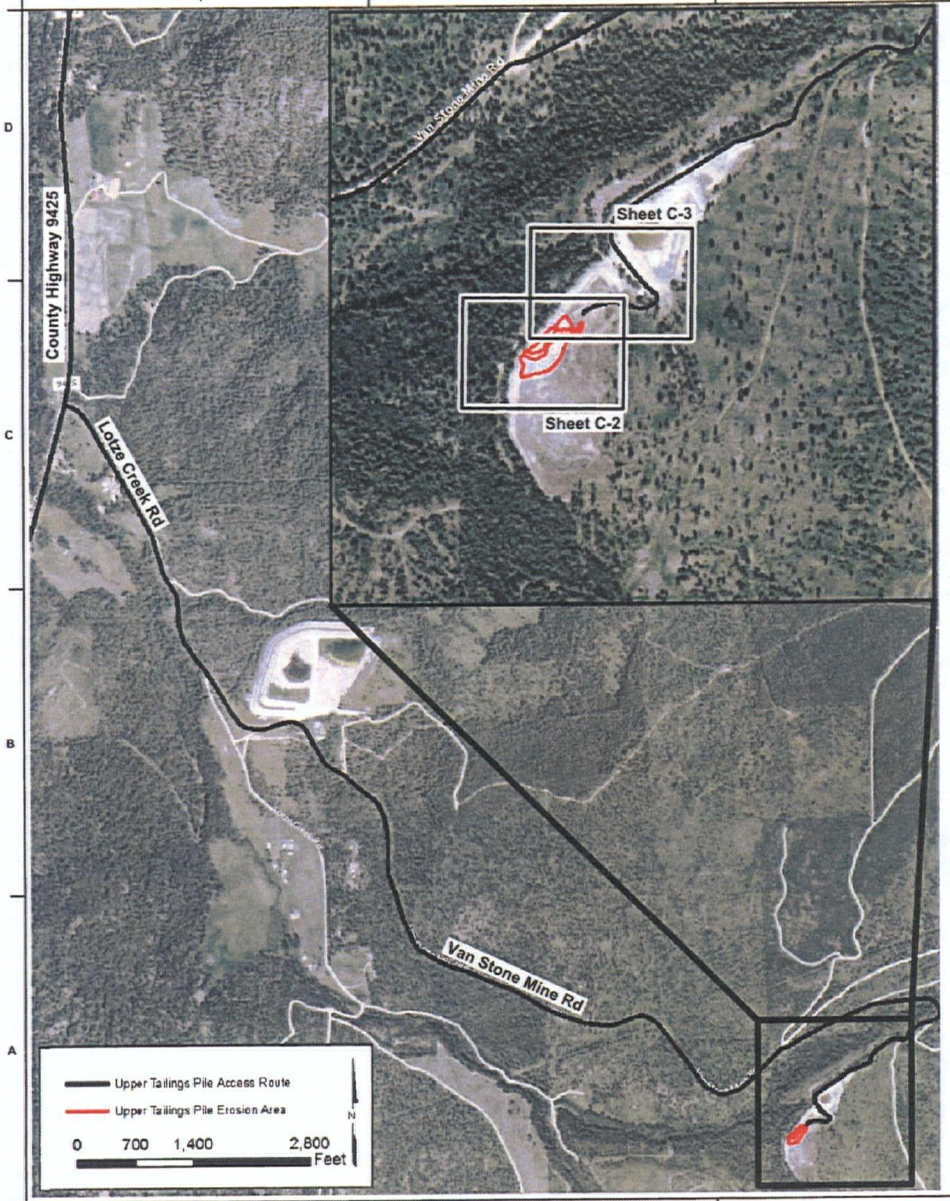
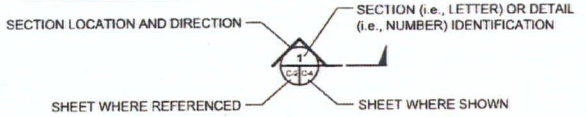


LIST OF PLANS

KEY TO SYMBOLS



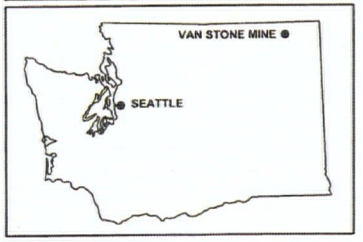
DITCH CENTERLINE

SILT FENCE

PROPOSED CONTOUR

EXISTING CONTOUR

REGIONAL MAP



HART CROWSER

REV.	DESCRIPTION	BY	DATE
1	DRAFT FOR REVIEW		
2	ISSUED FOR CONSTRUCTION		

Designed by: CP
Drawn by: EL
Checked by: MJB
Reviewed by: MJB
Submitted by: HART CROWSER, INC.
Date: 10/1/2012
Job Number: 17809-54
File name:
Plot scale:
Plot date:

VAN STONE MINE

VICINITY AND REGIONAL MAPS, LIST OF PLANS, AND SYMBOLS

Drawing Reference Number: C-1

Sheet 3 of 6

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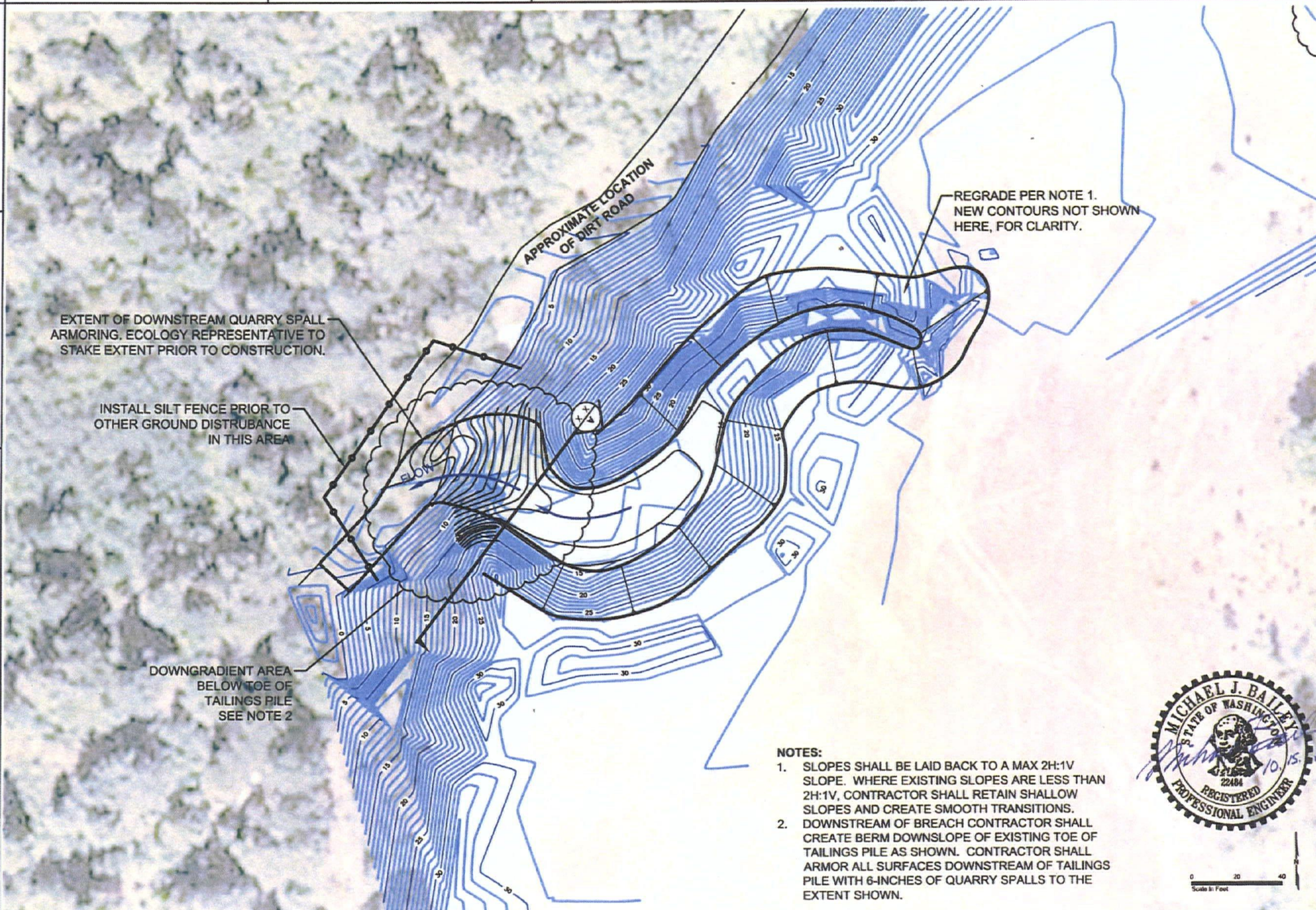

NOTES:

1. SLOPES SHALL BE LAID BACK TO A MAX 2H:1V SLOPE. WHERE EXISTING SLOPES ARE LESS THAN 2H:1V, CONTRACTOR SHALL RETAIN SHALLOW SLOPES AND CREATE SMOOTH TRANSITIONS.
2. DOWNSTREAM OF BREACH CONTRACTOR SHALL CREATE BERM DOWNSLOPE OF EXISTING TOE OF TAILINGS PILE AS SHOWN. CONTRACTOR SHALL ARMOR ALL SURFACES DOWNSTREAM OF TAILINGS PILE WITH 6-INCHES OF QUARRY SPALLS TO THE EXTENT SHOWN.

Designed by: CP | Date: 10/12/12 | Rev. 1
Dwn by: EL | Ckd by: MJB | Job Number: 17800-34
Reviewed by: MJB
Submitted by: HART CROWSER, INC.

VAN STONE MINE

AREA 1 SITE PLAN

Drawing Reference Number: C-2
Sheet 4 of 6

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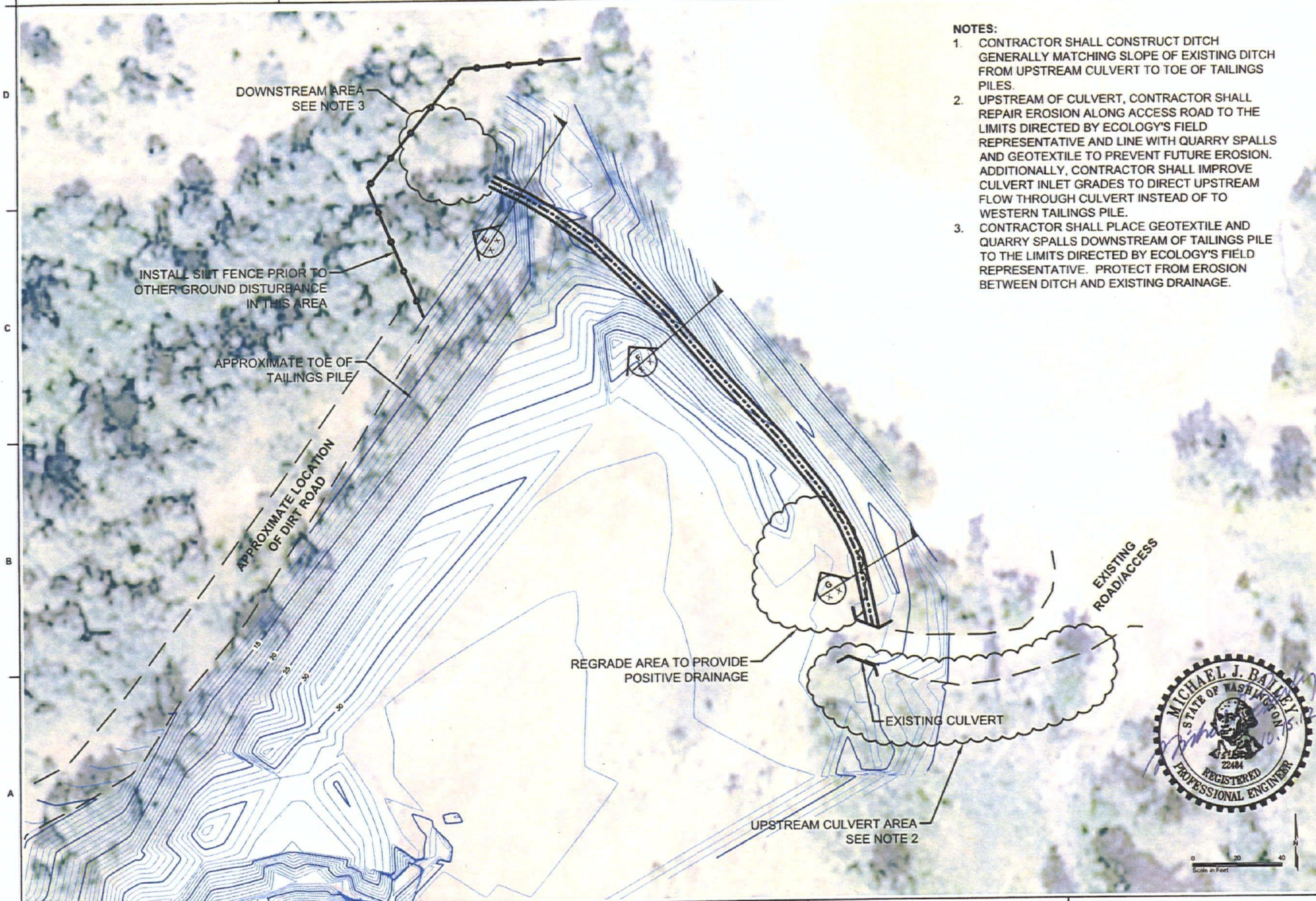

NOTES:

1. CONTRACTOR SHALL CONSTRUCT DITCH GENERALLY MATCHING SLOPE OF EXISTING DITCH FROM UPSTREAM CULVERT TO TOE OF TAILINGS PILES.
2. UPSTREAM OF CULVERT, CONTRACTOR SHALL REPAIR EROSION ALONG ACCESS ROAD TO THE LIMITS DIRECTED BY ECOLOGY'S FIELD REPRESENTATIVE AND LINE WITH QUARRY SPALLS AND GEOTEXTILE TO PREVENT FUTURE EROSION. ADDITIONALLY, CONTRACTOR SHALL IMPROVE CULVERT INLET GRADES TO DIRECT UPSTREAM FLOW THROUGH CULVERT INSTEAD OF TO WESTERN TAILINGS PILE.
3. CONTRACTOR SHALL PLACE GEOTEXTILE AND QUARRY SPALLS DOWNSTREAM OF TAILINGS PILE TO THE LIMITS DIRECTED BY ECOLOGY'S FIELD REPRESENTATIVE. PROTECT FROM EROSION BETWEEN DITCH AND EXISTING DRAINAGE.

HART CROWSER

REV. 1 DRAFT FOR REVISION
ISSUED FOR CONSTRUCTION

Designed by: CP | Date: 10/12/12 | Rev. 1
Dwn by: EL | Ckd by: MJB | Job Number: 17800-34
Reviewed by: MJB
Submitted by: HART CROWSER, INC.

VAN STONE MINE

AREA 2 SITE PLAN

Drawing Reference Number:
C-3
Sheet 5 of 6

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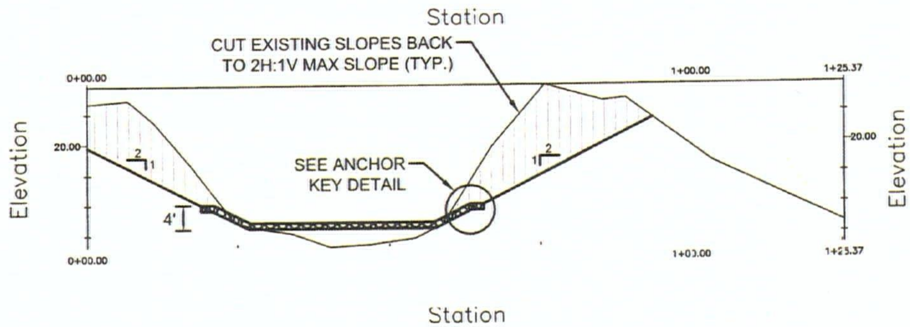
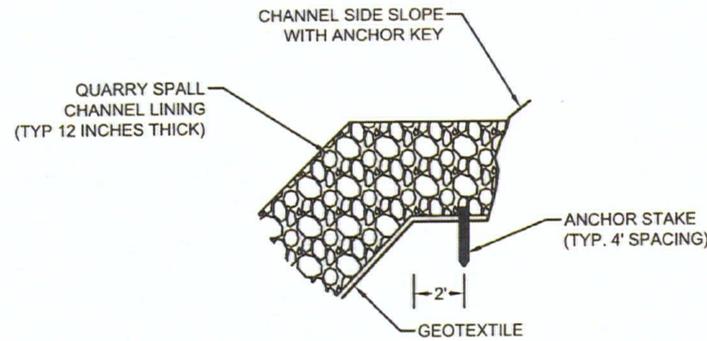
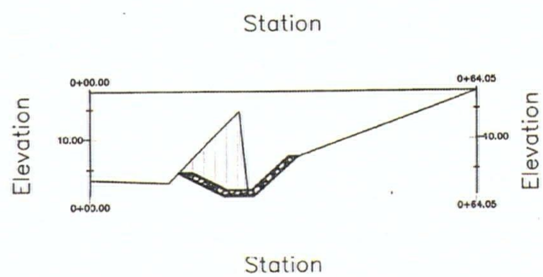


SECTION A

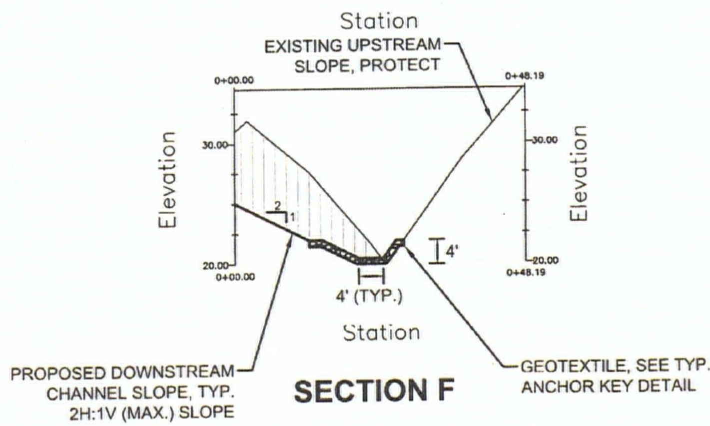


TYP. ANCHOR KEY DETAIL

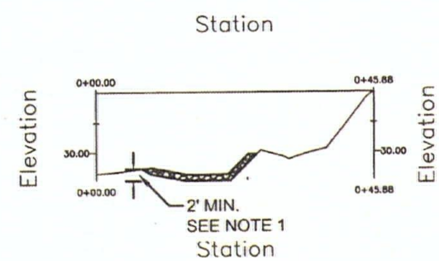
(NOT TO SCALE)



SECTION E



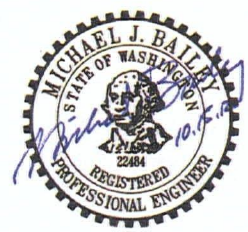
SECTION F



SECTION G

NOTES:

1. IN UPSTREAM AREAS WHERE EXISTING DITCH SLOPES ARE FLAT. CONTRACTOR SHALL GRADE TO CREATE A MINIMUM 4' WIDE BOTTOM, 2' TALL DOWNSTREAM SIDE SLOPE AT 2H:1V (MAX) SLOPE.



Horizontal Scale in Feet 0 10 20
Vertical Scale in Feet 0 5 10
Vertical Exaggeration x2

HART CROWSER

REV. 1 ISSUED FOR CONSTRUCTION
DRAFT FOR REVISION

Designed by: CP | Date: 10/12/12 | Rev. 1
Dwn by: EL | Ckd by: MJB | Job Number: 17800-34
Reviewed by: MJB
Submitted by: HART CROWSER, INC.

VAN STONE MINE

SECTION VIEWS

Drawing Reference Number:
C-4
Sheet 6 of 6

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